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CITRUS PRESS

Field of the Invention

The invention pertains to juicers and more particularly to a citrus juicer with a motorised reamer and specially configured actuating arm.

Background of the Invention

A wide variety of citrus juicers are known, including fully manual, fully automatic and motorised reamer varieties. In one known variety, a motorised reamer is supported by a housing. An inverted dome is carried by a simple pivoting arrangement and the dome is adapted to receive a half of a citrus fruit. The pivoting action of the dome brings the juice into contact with the rotating reamer. Continuous manual pressure against the dome brings the fruit into contact with the reamer and the fruit's juice is thereby extracted and collected. In this arrangement, the movement of the inverted dome is generally an arc of a circle whose centre is defined by a simple hinge that connects the inverted dome to the housing.

This type of motion, by definition, creates uneven contact pressure between the citrus fruit and the reamer and therefore leaves portions of the fruit intact. Further this type of motion generally knocks the fruit from the top of the reamer before the fruit is fully encapsulated by the dome. The travel of the inverted dome can be made more linear if the pivot point is moved a significant distance from the dome, however this is generally not practical. Further, the manual pressure required to bring the fruit into contact with the reamer does not benefit from a significant mechanical advantage. Therefore,

the device is sometimes difficult to use particularly for persons with limited mobility, dexterity or strength.

Objects and Summary of the Invention

It is an object of the invention to provide a citrus press that is safe, efficient and convenient.

Accordingly there is provided a motorised citrus juicer having a housing in which is located a motor which drives a juicing reamer. A manual actuating arm is attached to the housing. The manual actuating arm further comprising a main arm which forms part of a collapsing quadrilateral hinge. The actuating arm is configured so that the final portion of the citrus fruit's travel against the reamer is substantially linear.

In preferred embodiments, the actuating arm cooperates with a micro switch lock-out which prevents early rotation of the juicing reamer.

Brief Description of the Drawing Figures

Figure 1 is an exploded perspective of a motorised citrus juicer according to the teachings of the present invention;

Figure 2 is a perspective view of the juicer depicted in Figure 1;

Figure 3 is a perspective view of the main arm and fruit dome;

Figure 4 is a perspective view of a juicing reamer;

Figure 5 is a partially crossed sectioned view of a citrus juicer illustrating the dome and fruit travel path;

Figure 6 is a partially crossed sectioned view of a citrus juicer showing the final position of the actuating arm;

Figure 7 is a partially cross-sectioned view of a citrus juicer showing the initial, intermediate and final positions of the actuating arm;

Figure 8 is a side elevation depicting the actuating arm with the micro switch safety interlock activated to prevent reamer rotation;

Figure 9 is a side elevation of the actuator arm with the micro switch safety interlock released, allowing reamer rotation;

Figure 10 is a side elevation showing initial, final and intermediate positions of the manual actuating arm.

Best Mode and Other Embodiments of the Invention

Overview

As shown in Figures 1, 2 and 3, a motorised citrus press or juicer 10 comprises a main housing 12 which is attached to a foot molding 14. The foot molding has mounted beneath it a cord wrap 16 which includes a spacer 18 around which the unit's power cord can be encircled.

The housing 12 is constructed to contain a motor and gear box 20. In preferred embodiments, the motor's main or output shaft 28 mounted at a slight angle from vertical. The housing 12 contains an upper collar 22 having an upper rim 24 that is similarly inclined. The motor and gear box include a micro switch activator 26. The activator serves to engage the electric motor when the main shaft 28 is depressed and when power is available. Movement of the main shaft 28 activates an internal level which in turn depresses the micro switch 26 in a manner which is known in devices of this kind. The main shaft 28 enjoys a travel of about 3mm between activator's deactivated and activated positions.

The motor and gear box 20 are located and contained within the housing 12 by a top cap 30 through which the main shaft protrudes. A central opening 32 in the housing top cap 30 receives a driveshaft cap 28a which goes over the main shaft 28 and extends through the juice collector 34. The juice collector 34 comprises a unitary molding having a central elevation with an opening 36 for admitting the driveshaft cap.

Juice in the juice collector 34 selectively passes through a spout 36. The spout 36 is pivoted to the under-side of the juice collector and includes a stopper 114 (see Figure 2) which fits snuggly into a through opening which is

formed in the base of juice collector adjacent to the spout. When the spout is in an upper position, the opening is blocked by the stopper 114 and when the spout 36 is lowered, juice is free to flow through the opening, and down the spout. The opening and spout are located at a low portion of the juice collector when it is installed on the inclined driveshaft cap.

The driveshaft cap 28a passes through the juice collector 34 and through an optional stationary pulp filter 38. The pulp filter contains an enlarged main opening and a number of perforations 40 which allow juice but limit the flow of pulp. The rotation of the reamer 44 in proximity to the filter 38 helps to unblock the perforations 40 in the filter 38. The pulp collector 38 includes a central opening 42 that the driveshaft cap 28a passes through to enter a cooperating opening formed on the underside of the juicing reamer 44. The juicing reamer 44 includes a central mound 46 surrounded by radial slots 48, primarily for trapping seeds.

Fruit is brought into contact with the reamer 44 by using a specially configured actuating arm 62, 50, 72. The actuating arm includes a main arm 62 in which is formed an opening 113 which receives the stub 111 of a fruit dome 110. The fruit dome 110 includes an internal rib 112 and /or pins 136 which prevents the fruit half 106 from rotating under the influence of the rotating reamer. The fruit dome 110 also includes an external rib 132 which engages a slot in the main arm 134 and prevents the dome from rotating. Thus the actuating arm is an assembly including the main arm and links in the form of the major pivot arm 50 and the minor pivot arm 72 as will be explained.

As shown in Figure 2, the components depicted in Figure 1 assemble to form a compact citrus juicer 10. Individual components are now discussed.

Actuating Arm

In order to provide for efficient citrus juicing, a citrus fruit half must be brought into contact with the rotating reamer under considerable pressure. Prior devices have provided little or no mechanical advantage in effecting the required juicing pressure and have, where pivoting mechanisms have been used, provided eccentric travel and therefore non-uniform pressure of the citrus fruit half against the reamer. This type of motion tends to knock the fruit from the top of the reamer before the fruit is fully encapsulated by the dome. The present invention addresses certain ergonomic and safety issues by providing a manual actuating arm with components that are depicted variously in Figures 1, 2 and 6-10. It will be understood that the components of the actuating arm are hinged or pivoted to one another. In practice, exactly which components carry male or female hinge or pivot parts is immaterial.

The actuating arm includes a major pivot arm 50. In preferred embodiments, the major pivot arm 50 forms a channel with side walls 160. The major pivot arm 50 has lower pivot points 52 which are retained by and preferably within a lower portion 54 of a vertical well 56 that extends from the upper rim 24 of the housing 12. Upper pivot points 58 of the major pivot arm 50 attach to and pivot with a lower pivot connection 60 of the main arm 62.

The main arm 62 extends from the pivot point 60 to a major, nearly ninety degree bend 64 from which the main arm 62 changes direction and extends, in a gentle curve, toward a grip portion 66. A second or upper pivot

68 is located between the lower pivot 60 and the grip 66 and more particularly between the lower pivot 60 and the major bend 64.

The main arm's second or upper pivot 68 connects to a first or upper end 70 of a minor pivot arm 72. A lower pivot connection of the minor pivot arm 74 connects to a cooperating upper pivot 80 (see Figure 6) carried by the housing 12 above (and in this example slightly outward of) the lower housing pivot 54, for example within the vertical well 56.

Thus a collapsible quadrilateral hinge is formed having the following components: (a) the portion of the major pivot arm 50 between the lower and upper pivots 52, 58; (b) the portion of the main arm 62 between the lower and upper pivots 60, 68; the minor pivot arm 72 between its lower and upper pivots 70, 74; and that portion of the housing between the lower and upper pivots 54, 80.

The geometry established by the above components provides a number of advantages. It provides an arrangement which allows considerable pressure to be exerted on the fruit being pressed. It is compact given the mechanical advantage that is conferred. It provides a convenient arcuate movement to the dome as the dome reaches the zenith of its path. This allows easy access to the reamer for loading of the fruit. It also provides a generally linear motion during that part of the dome's path when linear motion is required, that is, when the fruit dome begins to encapsulate the fruit and compresses it down around the reamer.

The actuating arm may be biased away from the reamer, against the force of gravity, by a tension or balance spring 135 that interconnects and thus pulls the minor pivot arm 50 toward the housing (see Figures 1 and 6).

This keeps the main arm in its upper or extended position while fruit is loaded. When the arm is left in the down position (way-point 10), the downward force of the arm assembly is also reduced by the spring 135 so that the motor is not unintentionally activated.

Fruit Reamer

As shown in Figure 4, the central mound 46 or the reamer 44 includes full length ridges 120 as well as partial length radial ridges 122. The central mound 46 further comprises a spike 104 which is intended to hold the fruit in place as it is loaded onto the reamer when the arm is in the upper position. The upper portion of the full length ridges 120 surrounding the spike are generally horizontal to also aid in stabilizing the fruit before the fruit is encapsulated by the fruit dome. The spike 104 also acts as a spacer between the descending fruit dome 110 and the juicing reamer 44. This ensures that the rib 112 in the fruit dome cannot interfere with the ribs on the reamer 120,122 which prevents a stalling force being applied to the motor. The radius of curvature of the central mound 46 may optionally change from top to bottom. At the top of the mound toward the spike 104 the radius curvature is some what smaller than the radius of curvature at the bottom of the mound. This allows this skin or the peel of smaller citrus fruit such as limes to spread or expand when impinged against the reamer by the actuating arm 62. This encourages intimate contact between all portions of the interior of the citrus fruit's skin and the reamer thereby effectuates a thorough and efficient juicing action. The soft blend at the bottom of the mound 46 allows larger citrus fruits such as grapefruit to expand out to ensure all portions of the fruit are juiced.

In an initial or rest position, the juicing reamer 44 has an upper edge 100 which is generally level with the upper edge 24 of the collar 22. When depressed enough to activate the switch 26, the reamer rotates if power is available. The reamer contains radial slots 48 which allow juice to pass through and to separate seeds and large portions of pulp from the juice. The rotation of the reamer exerts a centrifugal force on the pulp to increase the amount of juice extracted.

Fruit Dome and its Path

As shown in Figures 5, 6 and 7 a centre of the fruit dome 110 describes a path 150 defined by way-points points 1-10. The course of the path 150 is determined by the orientation of the various moving parts which form the actuating arm. Importantly, the path 150 along the final way-points 5-10 describes a generally linear trajectory which is coincident with the axis of rotation of the juicing reamer 44. This ensures the fruit is not knocked from the top of the reamer as the arm moves into position and ensures an even gap and contact pressure with the fruit and therefore efficient juicing.

As shown in Figure 5, the actuating arm has an initial fully open position in which the major pivot arm is in close proximity to the housing 12, the upper and lower pivot points 52, 58 of the major pivot arm lying in a roughly vertical plane. In this orientation, the minor pivot arm 72 is lodged within the channel formed by the body of the major pivot arm 50 between the side walls 160. In this position, the fruit dome 110 is located above the juice collector and is well clear of the reamer 44 for easy loading of the fruit. In particular, the lowest point 162 of the rim of the fruit dome is located above

the major opening of the juice collector so that any droplets falling from the fruit dome are collected by the juice collector 34. In this initial or fully open position, the quadrilateral hinge formed by the main housing and the components of the actuating arm is in a collapsed position. In this way, the initial movement of the fruit dome 110 resembles motion about a fixed pivot, thus producing a roughly arcuate path through way-points 1-5.

As shown in Figure 6, the actuating arm has a terminal position in which the fruit dome is located directly over and concentric with the main dome 46 of the juicing reamer 44. Note that the central spike 104 contacts a cooperating recess 170 formed in the central interior of the fruit dome and thus creates a journal for the rotating spike 104 and a fixed gap between the dome and the mound. In this terminal position, the aforementioned quadrilateral hinge is in an expanded position are thereby imparting generally linear motion to the fruit dome. It will be appreciated that once the dome makes contact with the fruit that is loaded on the spike 104, further pressure against the handle portion 66 eventually causes the main shaft 28 of the motor-gear box unit to actuate the micro switch 26 and thereby cause the motor to turn. Actuation of the motor also requires the disabling of a safety lock-out switch and the operation of the switch 194 will be explained below.

As shown in Figures 1, 2 and 3, the fruit dome 110 may further comprise a stub shaft assembly 111 having an integral lower flange and integral rib 112. The underside of the flange may be provided with one or more small pins 136 to further stop rotation of the fruit. For ease of manufacture, the hemispherical shell 131 may be attached to the flange 130 and integral rib 112. The stub 111 is received by a cooperating opening 113

located between the primary bend 64 and the grip 66. The stub shaft assembly may also include an integral external rib 132 for engaging a slot 134 in the underside of the main arm so as to prevent the dome 110 from rotating (see Figures 1, 5 and 6). Friction between the stub 111 and the opening 113 is enhanced by the presence of an O-ring 115 which is shown more clearly in Figures 5-8.

As shown in Figure 10, the cooperating of the moving parts of the actuator arm produce a complex path for the fruit dome, the path comprising arcuate and linear portions as described above.

Safety Lock-Out

As shown in Figures 8 and 9 a switch actuator link 190 is located adjacent to the major pivot arm 50. It pivots about a lower axis of rotation 191. In preferred embodiments, a portion of the actuating arm makes contact with a cam surface 192 formed at an upper end of the switch actuator link 190. When the actuator arm is open and nearly open (way-points generally 1-5) the cam surface 192 makes contact with a normally closed micro switch 194 and thereby opens the micro switches circuit disabling the activating micro switch 26 which is associated with the motor gear box 20.

As shown in Figure 9, when the fruit dome 110 has traveled at least to an intermediate way-point) along the path 150 (generally way-point 6, the switch actuator link is urged away from the switch 194 so that the micro switch 194 closes the circuit which enables the activation of the micro switch 26. This allows pressure on the main shaft 28 to activate the motor in the motor gear

box 20. In preferred embodiments, the activating micro switch 26 is only effective during the linear portion of path 150.

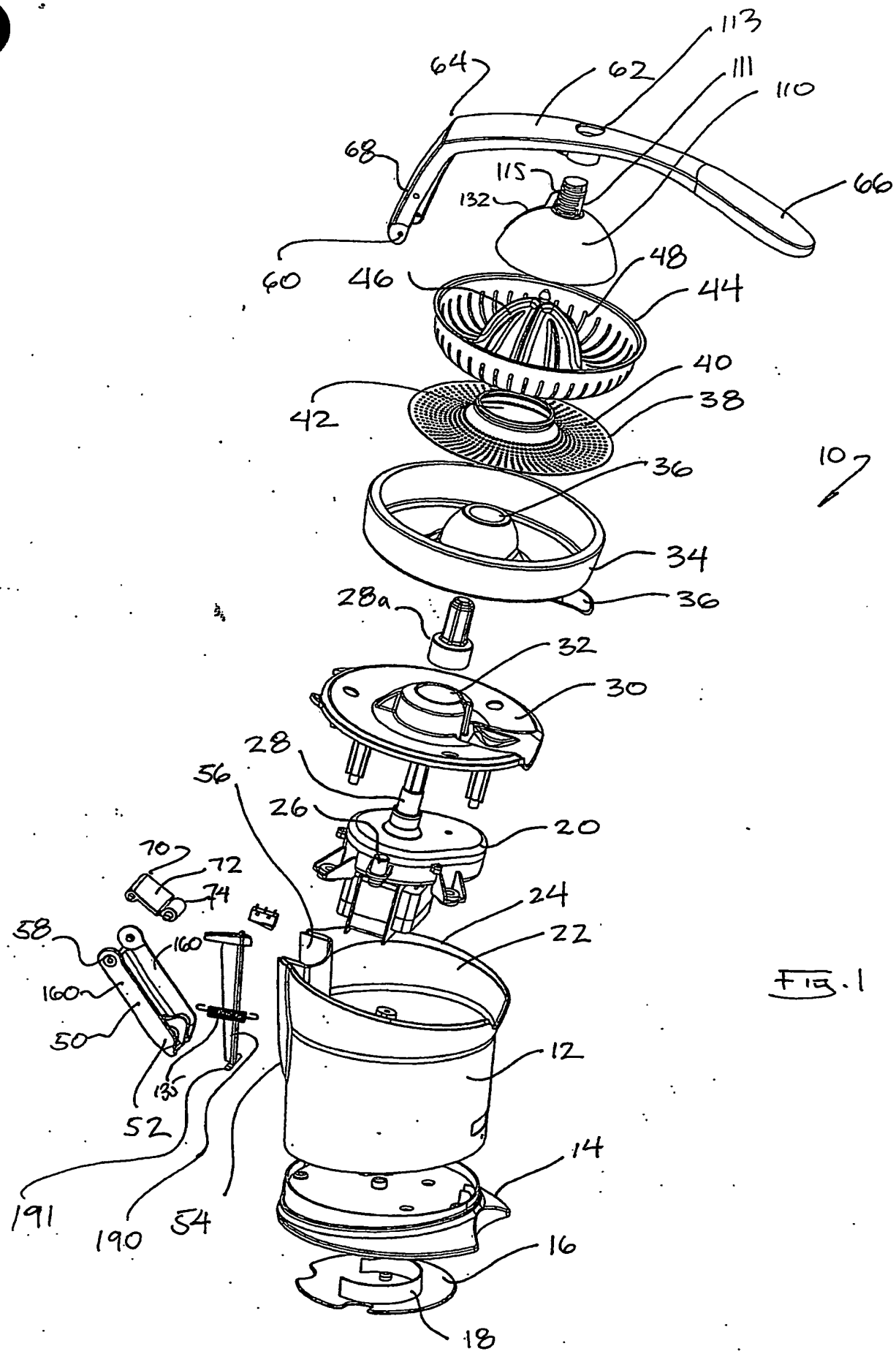
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Fig. 1

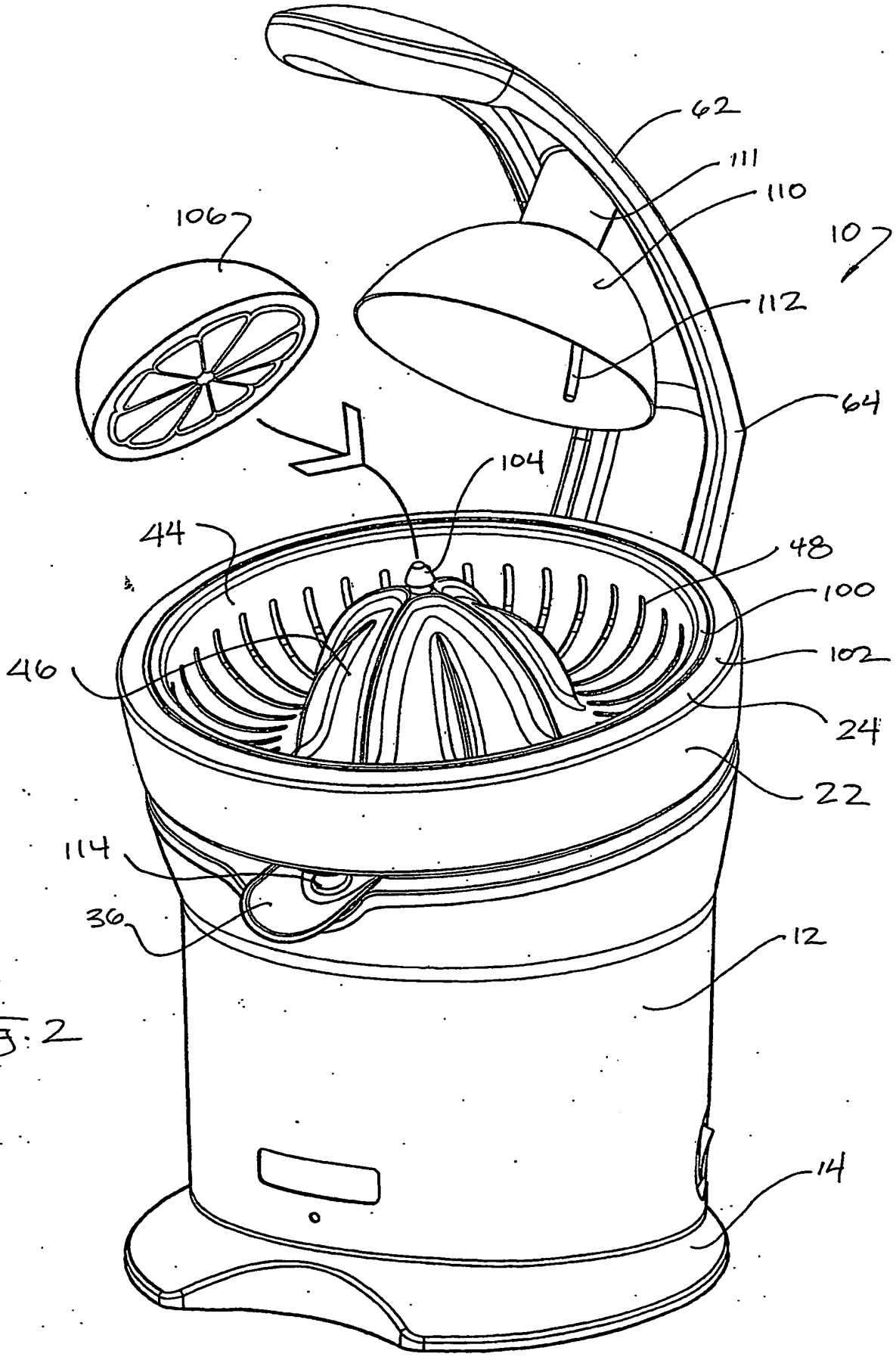
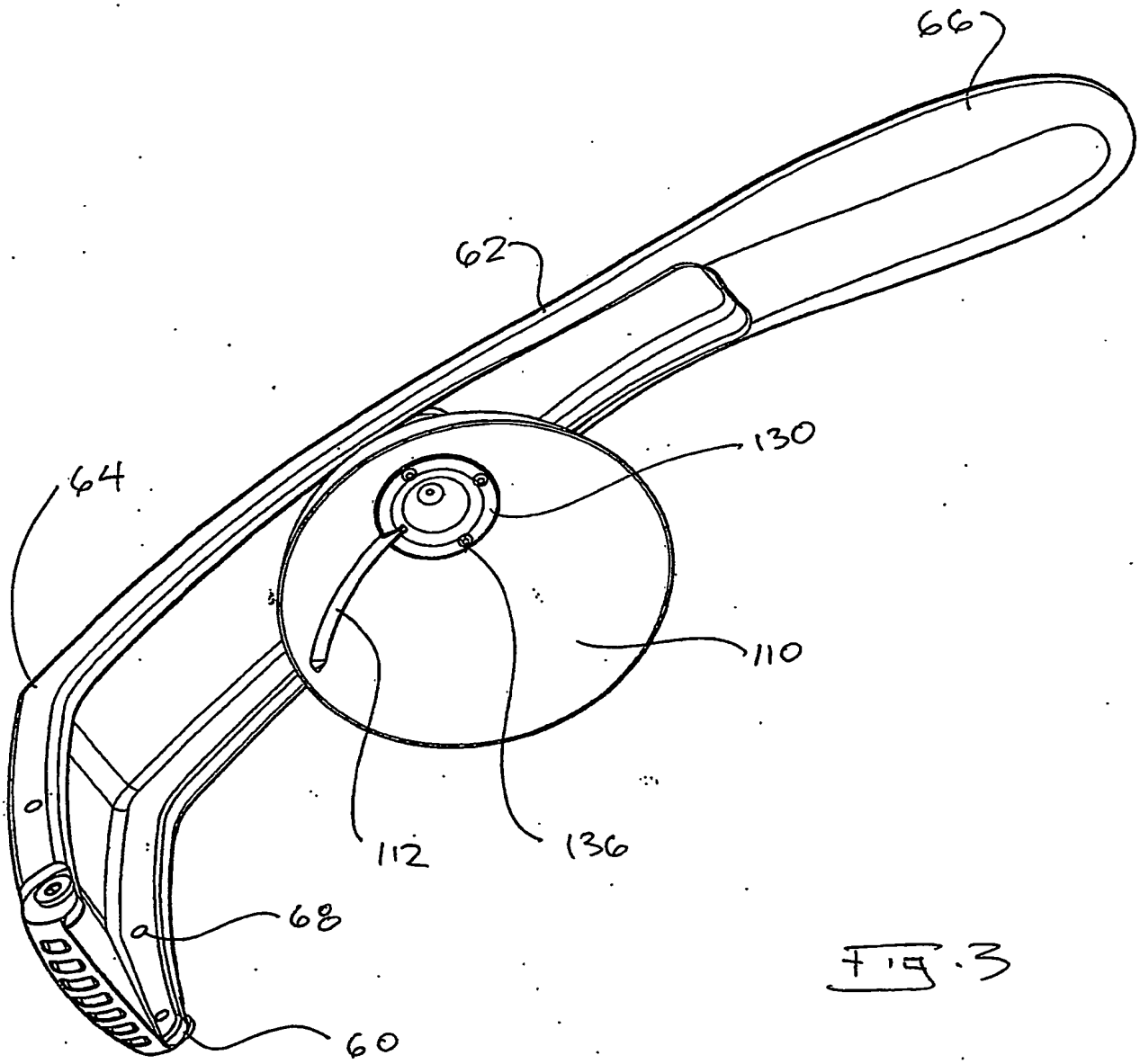


Fig. 2



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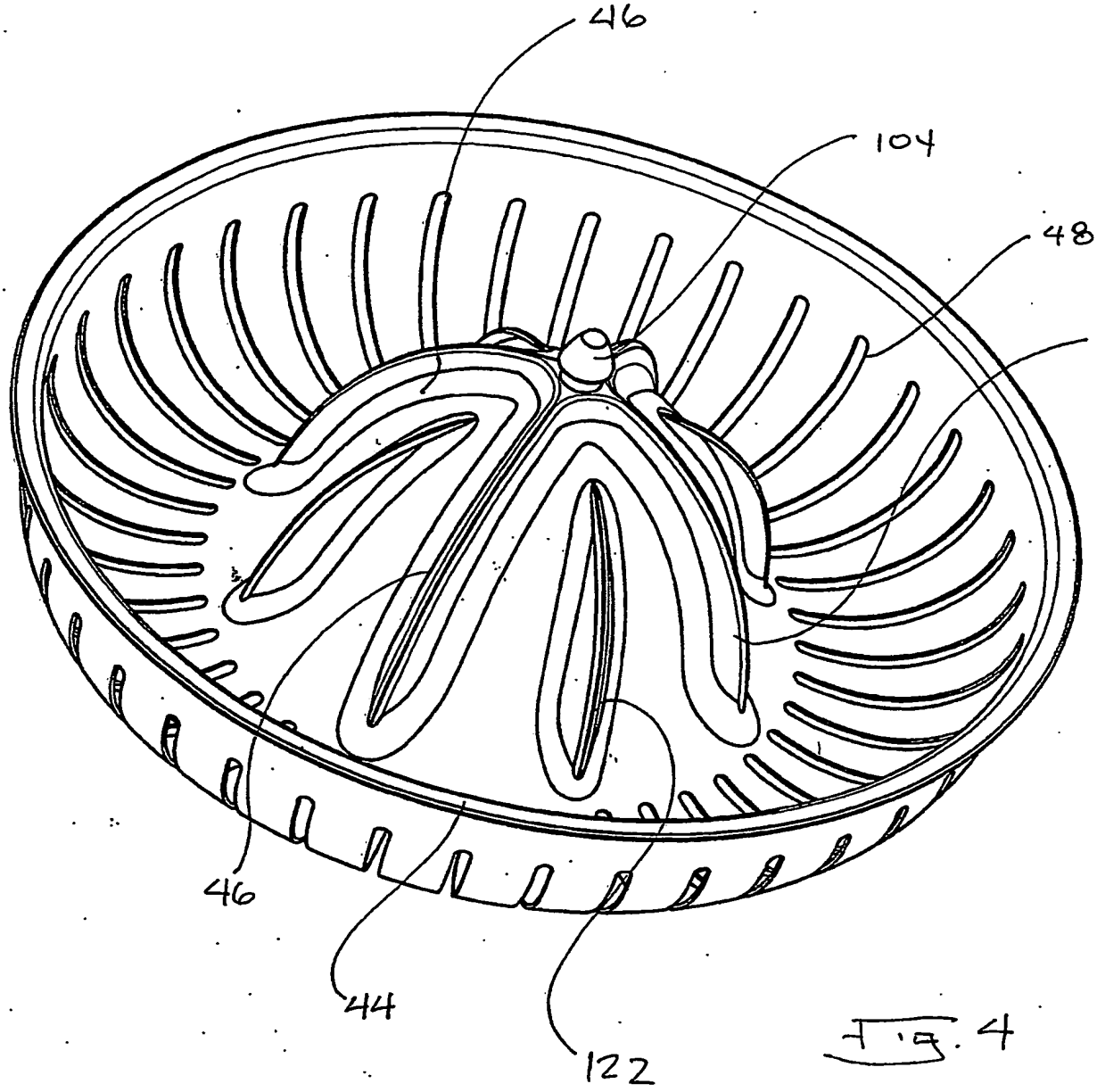


Fig. 4

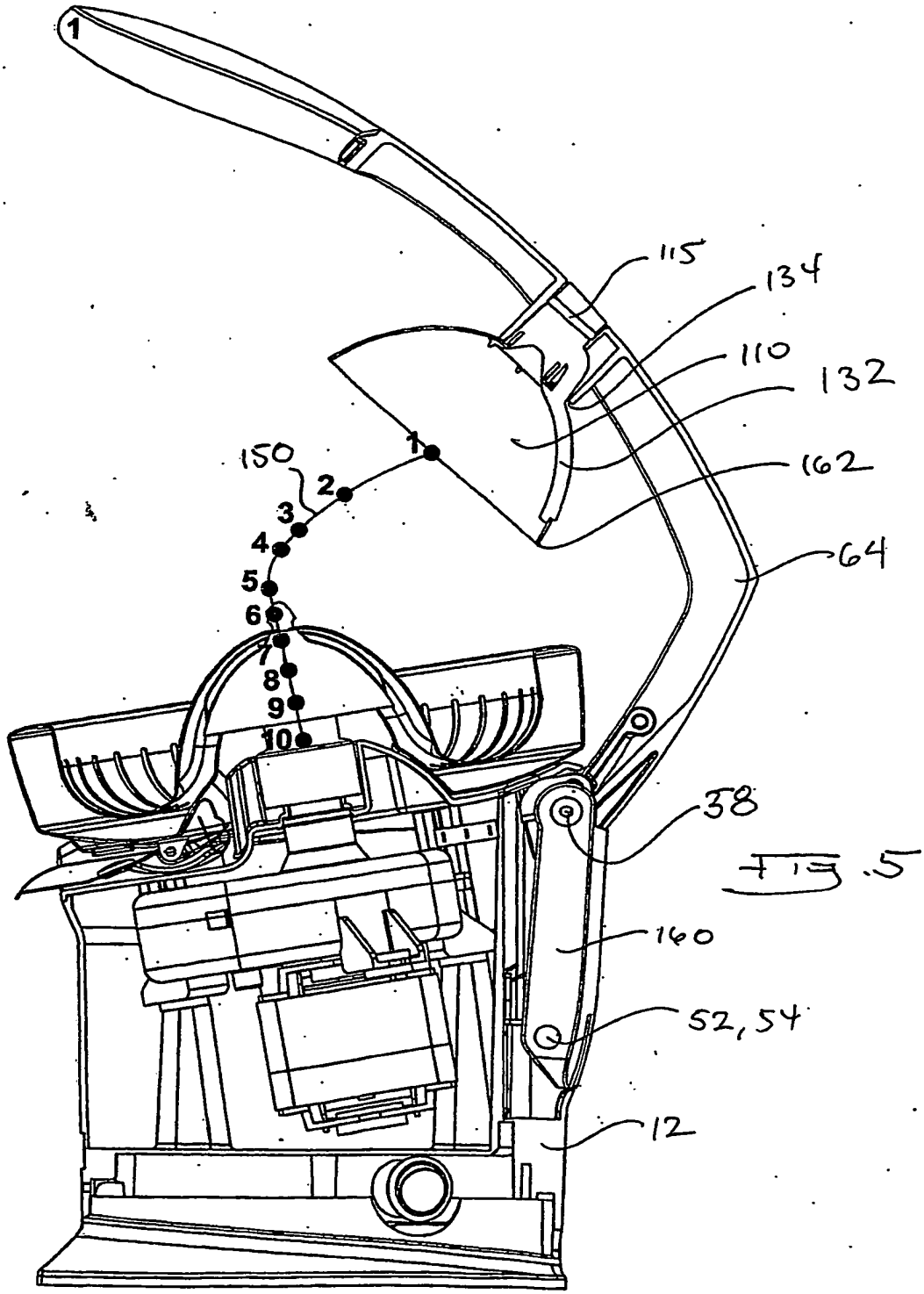


FIG. 5

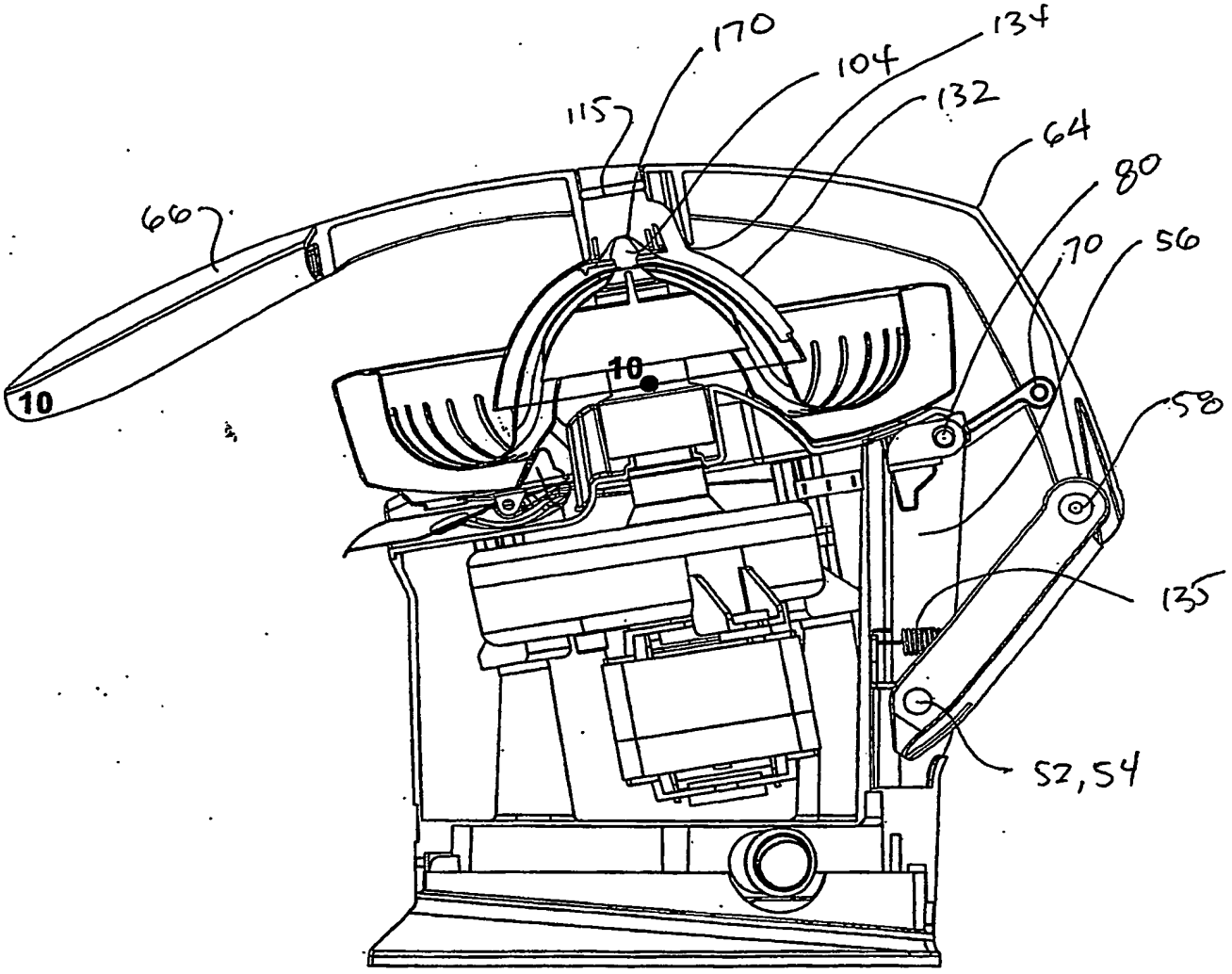
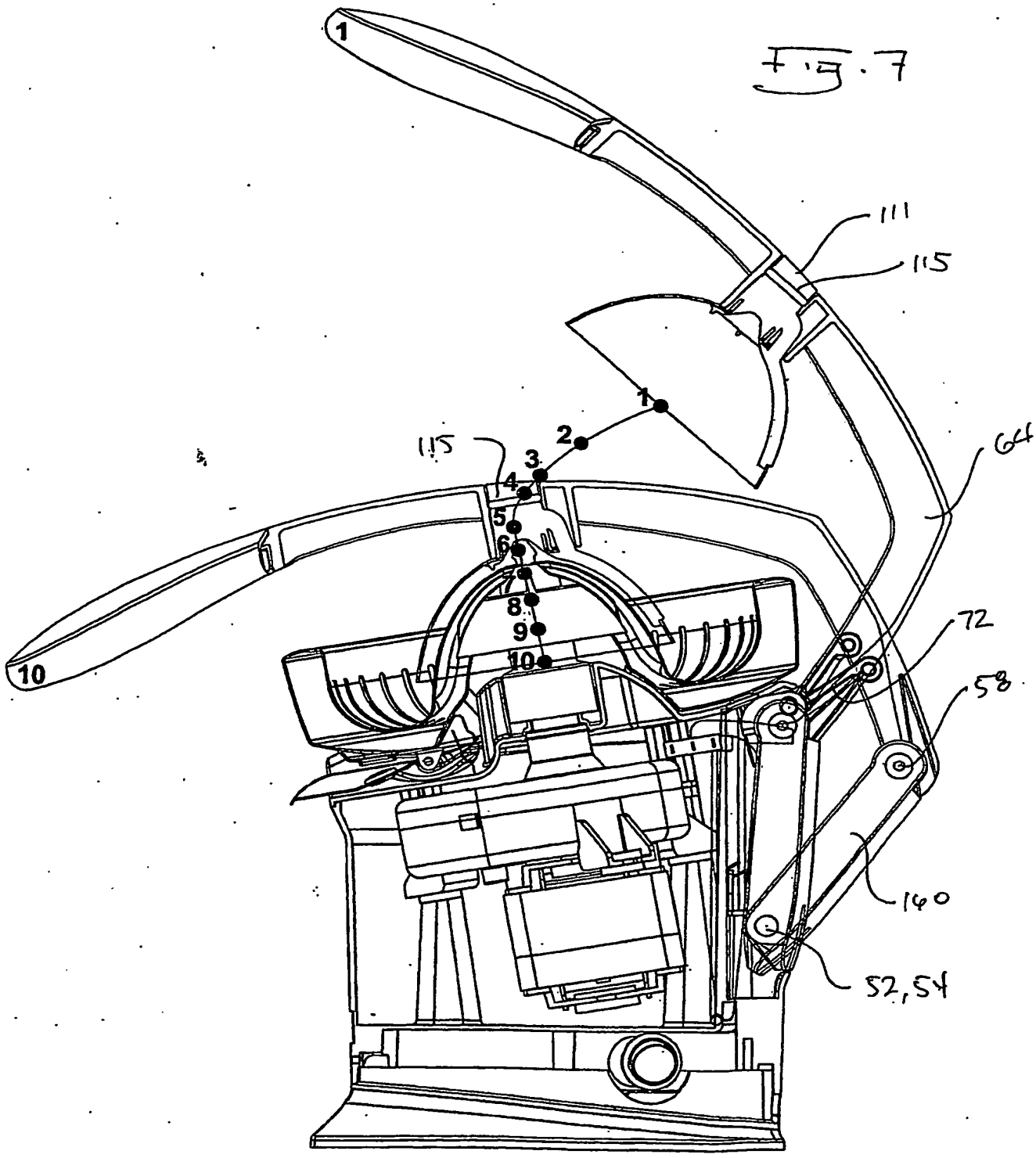


Fig. 6

Fig. 7



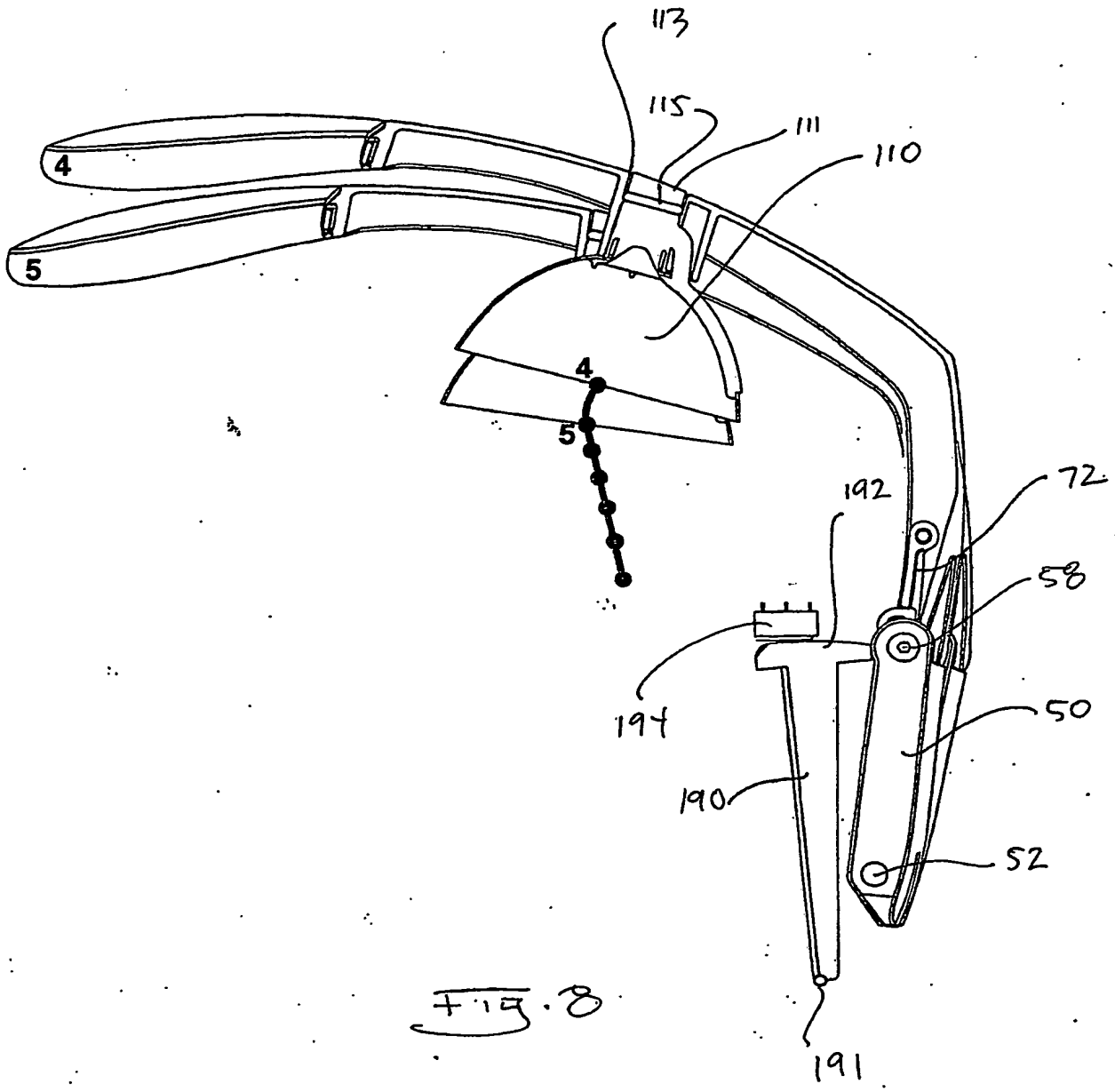


Fig. 8

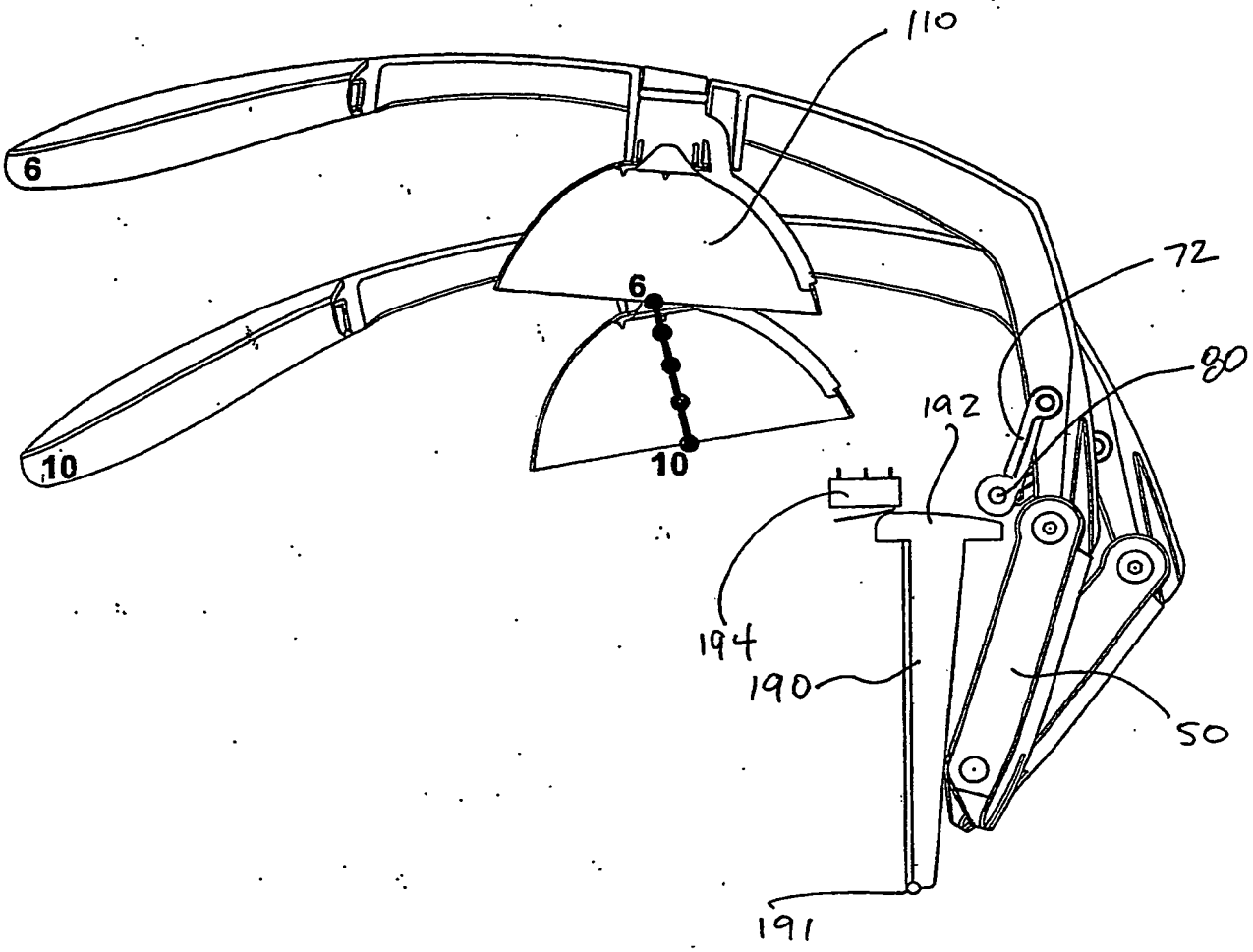


Fig. 9

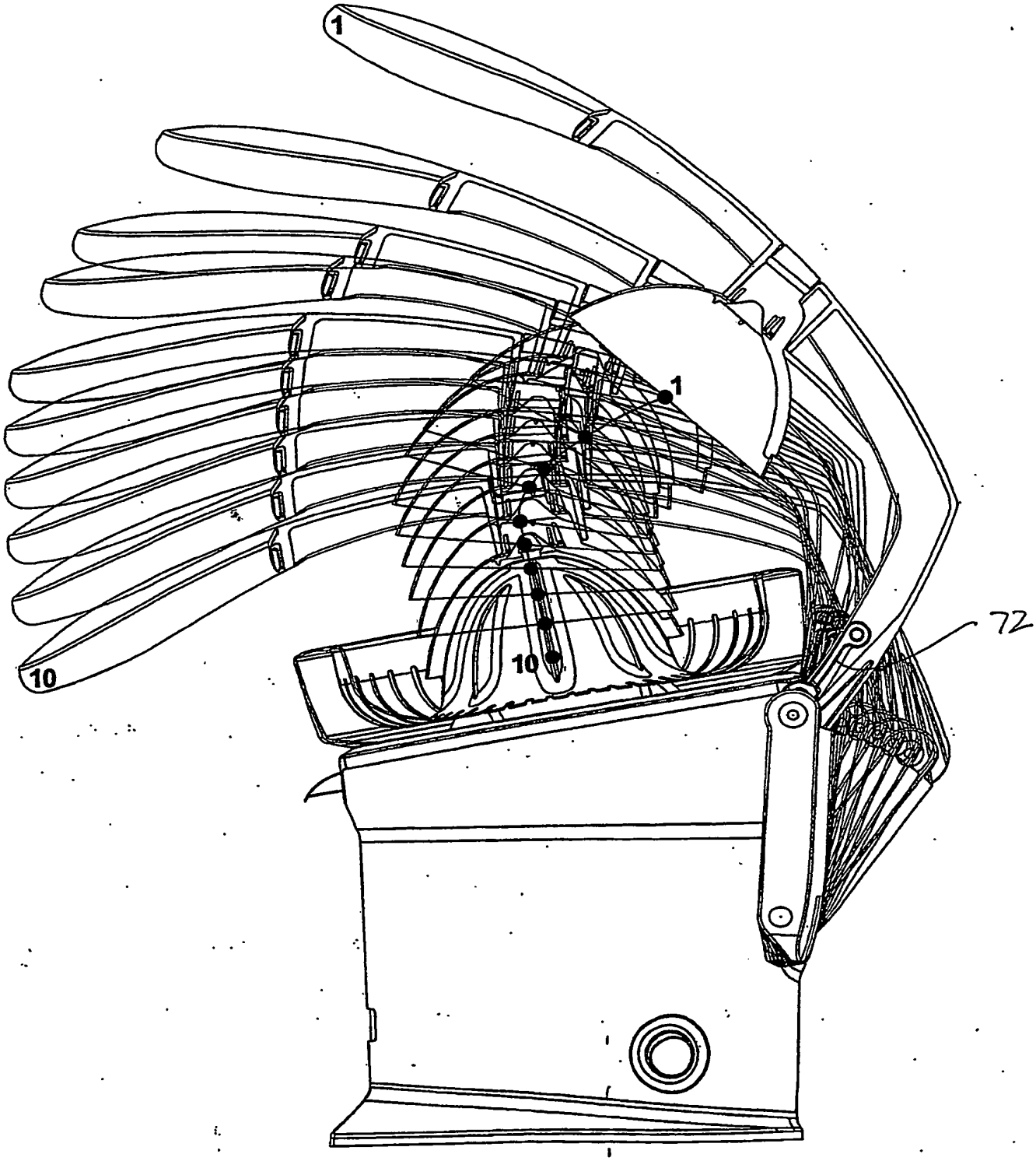


Fig. 10

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